Site 2 Pilot Study Results

- A pilot study was conducted during August-September 2006 to assess the effectiveness of vacuum extraction (multi-phase extraction or MPE) in removing hydrocarbon mass from the subsurface.
- ITSI used an internal combustion engine (ICE) to induce a vacuum on each study well to extract free phase product and soil vapor. Vacuum operations also produced groundwater.
- The following existing wells were used in the pilot study: RW-3; GTI-34; and GTI-30 (IR Site 4). A shallow vapor-only extraction well VES-1 was constructed; attempts to induce vapor-only extraction using this well were unsuccessful.
- The following tables summarize the pilot study results.

Site 2 Pilot Study Results

Approximate Free-Phase HC Mass Removed

Well Name	Screened Interval Depth (ft bgs)	Free Product Thickness July 2006	Depth (ft) to FP	Approximate Hours of MPE Operation	FP Produced (gallons)	Mass FP Produced (pounds)
RW-3	4.5-14.5	1.0	11.35	74	170	1,400
GTI-34	4-14	1.59	9.03	79	31	260
GTI-30	5-20	0.65	6.69	84	31	260

Site 2 Pilot Study Results

Approximate Vapor-Phase HC Mass Removed

Well Name	Approximate Hours of MPE Operation	Average Vapor Flow (scfm)	Average HC Concentration in Vapor (ppm-v)	Mass Vapor-Phase HC Produced (pounds)
RW-3	74	12	5,500	79
GTI-34	79	3	8,000	28
GTI-30	84	5	1,260	6

Site 2 Pilot Study Results

Approximate Dissolved-Phase HC Mass Removed

Well Name	Approximate Hours of MPE Operation	Water Flowrate (gpm)	Water Produced (gallons)	HC Concentration in Water (mg/L)	Pounds HC Removed
RW-3	74	0.8	3,360	400	2.4
GTI-34	79	0.8	3,072	400	2.9
GTI-30	84	0.8	3,360	400	2.7

Site 2 Pilot Study Results

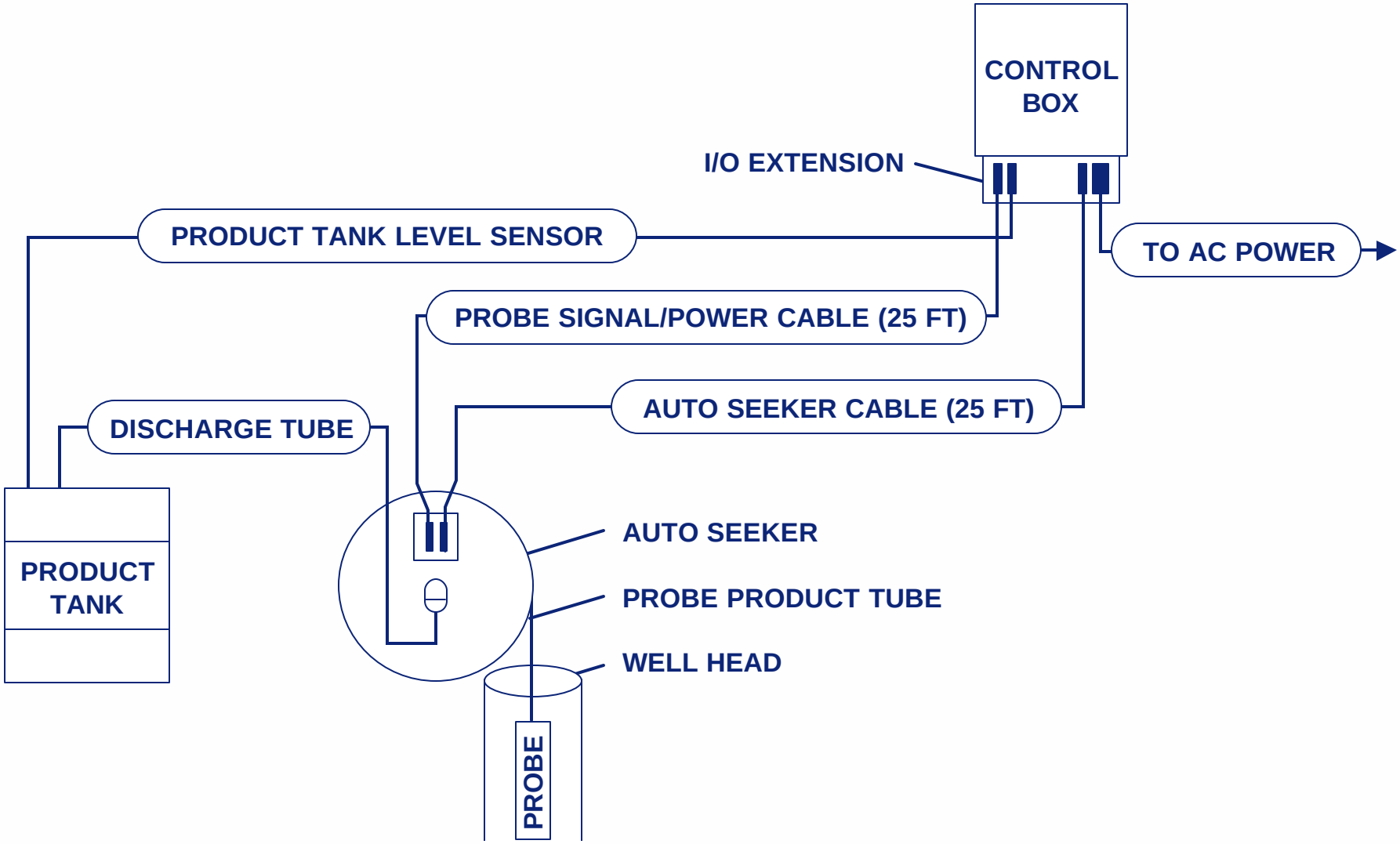
Summary of HC Mass Removed by Well

Well Name	Total Mass Removed (pounds)	Percentage Mass in FP Phase	Percentage Mass in Vapor Phase	Percentage Mass in Dissolved Phase
RW-3	1,480	94	5.3	0.2
GTI-34	290	90	9.3	0.7
GTI-30	268	97	2.2	0.1

Site 2 Pilot Study Results

- The pilot study technical memorandum was recently submitted to NDEP for review.
- The memorandum presented all data collected during the pilot study, including analytical results. Media analyzed during the study included recovered FP (carbon distribution); soil vapor; ICE exhaust vapor; and groundwater (inorganic and organic constituents).
- Recommendations in the memo included implementing FP recovery using a low-maintenance, non-vacuum pump system. The Magnum Spill Buster system from Clean Earth Technology, Inc., was selected for FP pumping.
- Magnum systems were installed at wells GTI-13 and RW-3 in April 2007. Initial results are promising. In addition, FP recovery is being conducted one day per week on a well-to-well basis using a portable recovery system.
- Results from the FP recovery efforts will be used by the Navy to identify and implement an effective, permanent remedial technology at the site.

Site 2 Pilot Study Results



Site 2 Pilot Study Results

- **Magnum Spill Buster installation at IR Site 2.**